TT 77-53041

From: Veterinariya, Kiev, Vol. 35, 1973, pp. 17-23

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CURRENT SITUATION OF FOOT-AND-MOUTH DISEASE CONTROL IN THE UKRAINE (Aktual'ni pitannya borot'bi z yashchurom na Ukraini).

Translated from Ukrainian

Prepared for the Animal and Plant Health Inspection Service, United State Department of Agriculture and National Science Foundation, Washington, D.C., by Saad Publications (Translations Division).

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N.I. Cuschin (1964) had calculated that the loss as a result of Foot-and-Mouth Disease per animal, is as follows: 7 to 46 rubbles for each cattle, 2.6 to 6 rubbles for each pig and 44 kopecks to 3.8 rubbles per sheep.

The loss in the milk production of cows as a result of the development of the Foot-and-Mouth Disease, depending on the productivity of a cow, is 9.4 to 30%.

The latest Foot-and-Mouth Epizootic in Europe caused a loss of upto 600 million Dollars.

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According to the data of Kouba (1965), the large cattle that were fattened and later on developed the Foot-and-Mouth

Disease, lost, on an average, 30.2 kg of weight.

The damages, as a result of the Foot-and-Mouth Disease, constitute both direct and indirect expenses. The extent of the damage depends on the severity of the disease, effectiveness of the measures adopted to combat the virus, time of the year and other factors.

In our country the prophylaxis and measures to fight this disease is of national importance.

The problem of the Foot-and-Mouth Disease is fairly wide spread. This paper discusses it from the point of view of the epizootologyst and deals with the most rational measures of prophylaxis and measures to combat this morbidity.

During the last 20 years on the territory of the Ukrain SSR, three cases of epizootic have been recorded: the Foot-and-Mouth epizootic of 1952 to 1955 was caused by the viurs type A-7; in 1958 to 1963 it was caused by the virus type O-2 and the 1965 to 1966 epizootic was caused by the A-22 type virus.

The first of these epizootic penetrated the West in 1952, and was sufficiently discussed in the foreign literature (Tluckiger, 1952; Ramon, 1962) and by our own publication (G.F. Bondarenko, and S.P. Didovets, 1970; and G.F. Bondarenko, 1959).

The second epizootic, caused by the O-2 virus, commenced in the countries of the Near East, covered the Caucasus and then, towards the end of the 1958 summer, it penetrated the Ukrain through the Crimean peninsula.

The Foot-and-Mouth epizootic, caused by the A-22 virus, penetrated the Republic almost in the same manner as the second epizootic. During the 1964 period and the first half of 1965, it was registered in the Trans-Caucasus region, then it penetrated the Central regions of RSFSR (the Russian Soviet Federative Socialist Republic) followed by the northern and eastern regions of the Ukrainian SSR.

During these years, the foot-and-Mouth Disease was benign,

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During the last 30 years on the territory of the USSR, three cases of epizootic have been recorded: [illegible] and-Mouth epizootic of 1952 to 1953 was caused by the virus type A-27; in 1953 to 1955 it was caused by the virus [illegible] and the 1965 to 1966 epizootic was caused by [illegible] virus.

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for the most part, and only in one of the western regions of the Republic, in 1953, the disease proved to be malignant in nature.

After vaccinating the majority of the large cattle in areas that were in danger of the disease and areas where the virus had flared-up, the virus that had caused a malign form of illness, had changed its properties in animals that were vaccinated against the Foot-and-Mouth Disease and the malign form of morbidity had ceased (G.F. Bondarenko, 1959).

Each of these three epizootics had its own peculiarity in the development, duration and intensity of the process.

If we accept as 100% the number of animals which had developed the Foot-and-Mouth disease during the 1952-1955 epizootic (Foot-and-Mouth Disease type A-7), then the number of the large cattle that went down with the disease during the 1958-1963 epizootic (Foot-and-Mouth Disease type O-2) was 59, the number of pigs was 240 and sheep 972; whereas during the 1965-1966 epizootic (Foot-and-Mouth virus type A-22) the number was: 570, 612 and 445 respectively.

The data available illustrates that the first two epizootics were longer, but the number of animals, namely, the large cattle and pigs that had developed the disease were substantially less than during the latest epizootic of 1965 - 1966.

Although the number of danger points was less in 1965-1966, as compared to the epizootic caused by the virus type A-7, the number of animals which had developed the disease among the large cattle was more by 5.7, the number of pigs by 6.1, sheep and goats by 4.4 times.

The number of large cattle which had perished as a result of the foot and mouth disease during the 1952-1955 epizootic was 0.7%, pigs 5.4%, and sheep 1%; during the epizootic of 1958 to 1963 it was 1.7, 11.6 and 4.5, respectively; whereas during the 1965 to 1966 epizootic the number was 0.2, 1.8 and 0.5% of the total number of animals which had developed the Foot-and-Mouth disease.

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The number of large cattle which had perished as a result of the foot and mouth disease during the 1952-1955 epizootic was 0.77, pigs 5.4%, and sheep 1%; during the epizootic of 1958 to 1965 it was 1.7, 11.6 and 4.5, respectively; whereas during the 1965 to 1966 epizootic the number was 0.2, 1.8 and 0.5% of the total number of animals which had developed the Foot-and-Mouth disease.

Each epizootic had its own peculiarity and after-effects:

Thus, one of the characteristics after-effects among the large cattle which had developed the foot and mouth disease during the epizootic caused by the virus type A-22, were complications that had set-in 3 to 6 months after the illness. These complications were observed during the months of August and September, 1966, mainly in southern regions of the Republic and were evidenced as cardiovascular diseases. In some herds, among the animals which had earlier developed the Foot-and-Mouth Disease, 5 to 10 and in some areas upto 25% of cows were observed to suffer from the cardiovascular complications.

The clinical complications included; short-windedness, loss of weight, decreased productivity and delay in shedding their hair. These complications continued during 3 to 4 years (period of observation), and the meat of such animals, as a rule, was declared as defective.

The large cattle and pigs developed a more severe form of Foot-and-Mouth Disease; during this epizootic, a greater number of younger animals died than during the other two epizootics.

The other two epizootics (caused by the Foot-and-Mouth Disease virus type A-7 and O-2) commenced during the summer months (July - August) in the territory of the Ukrainian SSR.

The Foot-and-Mouth Disease, caused by the virus type A-22, was first recorded in the month of October, 1965, within the northern and north-east regions of the Ukrain. From the first days of the epizootic, the Foot-and-Mouth Disease was widely distributed and during the months of October-December, 1965, as many as 63 areas were attacked by the virus, which included 61% of the large cattle, 50% of pigs and 46% of sheep, which had developed the Foot-and-Mouth Disease as compared to the total number of animals during the 1965-1966 epizootic.

During the highest peak period the epizootic, almost all the large cattle in farms of areas attacked by this infection were affected by the Foot-and-Mouth Disease.

During the years that followed, the so called "Post-epizootic period" (from 1968), the disease among the large cattle was of a mild nature and attacked a small number of cattle. This was the result of the fact that a substantial number of animals had already had the foot-and-Mouth Disease

[illegible]

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(6)

and the mass immunization of animals as a measure of prophylaxis and, possibly, certain changes in the properties of the causal agent.

The experience in combating the Foot-and-Mouth Disease has proved that in the continental countries, which are connected by land, it is impossible to achieve a substantial decrease in the development of the foot-and-Mouth Disease by employing only general veterinary sanitary measures, because of widely distributed virus-carriers. As a result of this, such countries have to employ vaccination.

In the Ukrain, taking into consideration the epizootic conditions of this infection, the prophylactic method of immunization was utilized on animals throughout the whole territory or in special regions of the Republic.

The prophylactic vaccination of the animals against the Foot-and-Mouth Disease in the Ukrain SSR was commenced at the end of 1953, when in order to fight the malignant type of Foot-and-Mouth Disease, a complex method, which included the veterinary sanitary measures with vaccination, was employed.

During this period, the vaccine was manufactured in a limited quantity, using the VIEV method.

During the recent years, the vaccination of the large cattle with the aim of prophylaxis is very common throughout the Republic.

In 1967, we immunized 29378,9 thousand heads of large cattle, 54.3 thousand pigs and 106.3 thousand sheep; in 1968 the number was 18034, 66.3 and 34.7, respectively; in 1969 the number read: 35649.6, 51.2 and 31.9, respectively; in 1970 the number of animals immunized was: 29549.7, 79.0 and 41.8, respectively and finally in 1971 it was 24514.3, 140 and 1306,4 respectively.

The vaccination was carried in certain regions (zones), depending on the epizootic situation.

Thus, for example, in the western regions where the disease was not recorded for more than 5 years, the anti Foot-and-Mouth

Disease vaccination was not carried out.

During the last few years, the inactivated vaccine, using the lapinized Foot-and-Mouth Disease virus, was utilized for the purpose of vaccination. However, in some cases, in areas where this disease had flared up, the Foot-and-Mouth infections were observed among the immunized heads of cattle.

The studies have shown that the poorly fed, physically under-developed (younger cattle, 4 to 6 months old) animals, as well as, lengthy transportation, driving of cattle, sharp changes in the weather have a negative influence on the immunological changes of the organisms and the development of immunity.

We studied the stress on the immunity in the immunized animals.

The strength of the immunological effect after vaccination was determined by the condition of the immunized animals in areas affected by the Foot-and-Mouth Disease and by the level of the virus neutralizing anti-bodies in the blood serum.

While studying the degree of immunity, after the large cattle were vaccinated using the saponin vaccine, it has been established that on the 20th day, the virus neutralizing activity of the blood serum increased by 43 times. A repeated vaccination after 20 days increased the activity of the blood serum by 3900 times, as compared with the activity of the serum before the vaccination and by 90 times after a single vaccination.

At the highest level, the humoral immunity is retained for a period of 116 days, then on the 180th day it comes down to a level, which is only 10 times more than the initial. However, re-vaccination of such animals again established a high humoral immunity.

If we accept the view established by the international practice that 10 thousand infection dozes of the Foot-and-Mouth virus can cause a generalized type of infection in the immunized animals, then on the 20th day after a single dose of vaccine has been introduced into 1 ml of the sheep blood serum, such a number of anti-bodies are formed that are capable to neutralize more than one doze of the virus infection. After the two-phased

immunization was not carried out.

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While studying the degree of immunity after the large [illegible] immunized using the aqueous vaccine, it has been established that on the 20th day, the virus neutralizing [illegible] of the blood serum increased by [illegible] times, as compared with the activity of the serum [illegible] the vaccination and by 90 times after a [illegible] vaccination.

At the highest level, the general immunity [illegible] a period of 110 days, then on the 180th day it comes down to a [illegible] which is only 10 times [illegible] the initial. However, [illegible] immunized [illegible] immunity.

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vaccination introduced into 1 ml of the blood serum, the number of anti-bodies increased to such an extent that it was sufficient to neutralize 117 dozes of the infective virus.

The experimental data confirms the practical observations. The effectiveness of the saponin vaccine depends on the age of the animals and periods of their vaccination, as illustrated in Table 1.

The data given in the Table, illustrates that the vaccine is not very active in 2 to 10 month old sheep.

TABLE - 1

THE EFFECTIVENESS OF THE SAPONIN VACCINES

Post-vaccination period (revaccination), days.	Age of the animals (months)	Total number of animals in infected areas heads	Animals that have developed the foot-and-mouth disease	
			Total	Percentage from the total number of cattle head in the area.
1 - 19	Veal:	370	1	0,3
	12 - 24	1345	26	1,9
	2 - 10	4331	1032	23,8
20 - 50	Younger cattle			
	13 - 36	794	75	9,4
	2 - 10	2191	580	26,0
68 - 90	Veal:	370	9	2,4
	Younger cattle			
	12 - 36	677	34	5,0

TABLE 1 CONTINUE

	2 - 10	1650	450	27,0
150 - 180	Veal:	74	2	2,7
	Large Cattle			
	18 - 36	435	50	11,0
Not vaccinated	Horned cattle			
	pigs	109	109	100.0
		3835	2766	72,0

As a prophylaxis against the Foot-and-Mouth Disease, specially to prevent the death of the younger cattle during all the cases of epizootic, the use of the reconvalesent blood serum and blood taken from the hyper-immunized animals played a very important part. Onlyin 1965 - 1966, in 13 regions of the Republic, 1423.6 thousand liters of serum had been manufactured and more than 80 thousand heads of animals were immunized. This has also played an important part in the fact that during this epizootic a very small number of animals lost their lives.

The number of animals that had developed the Foot-and-Mouth Disease during the post-epizootic period and caused by the A-22 type of virus, was recorded in odd cases, both, among the non-vaccinated as well as the vaccinated herds of cattle.

In a few cases, some decrease in the appetite, slight appearance of saliva, increase of the body temperature up to 40 - 40.5°C was observed in some animals. Small quantities of aphthae were observed in the mucous membrane of the mouth, specially in the suckling animals. In the greater number of the large cattle, that developed the Foot-and-Mouth Disease, aphthae were not observed, because the period between the formation of the aphtha and its disappearance was very short.

The animals, as a rule, recovered after 3 to 4 days and loss of the younger animals was almost nil.

The incidence of the Foot-and-Mouth Disease during the post-vaccine immunity of calves is explained by the immature organism and stresses; in case of the older animals, this phenomenon may have been as a result of insufficiently fattened animals during the period of vaccination of the result of a physiological burden (pregnancy) and other factors. The break in the immunity was also observed as a result of poor immunogenic properties of the vaccine. Among the non-specific after effects of vaccination, the alergic reactions (anaphylaxis) are worthy of attention, namely, miscarriage and activation of the sub-clinical types of chronic infections.

Despite all the after-effects, the annual vaccination of animals in Ukrain SSR is very popular and plays an important part in prophylaxis against the Foot-and-Mouth disease.

In Ukrain, the anti-foot-and-mouth measures are carried out in the following directions:

I. TO PREVENT THE IN COMING OF THE FOOT-AND-MOUTH VIRUS FROM OTHER COUNTRIES INTO THE TERRITORY OF UKRAIN.

For this purpose, the veterinary-sanitary measures are employed to control the export-import operations and enterprises which process products and raw material of farm animal origin that is imported into the Republic.

Measures are taken on the borders of the Republic in order to prevent the entry of infection by wild animals specially during their migration, the animals in the boundry regions of settlements are also systematically checked.

II. TO PRESERVE THE ZONES FREE OF THE FOOT-AND-MOUTH DISEASE.

For this purpose, general veterinary-sanitary measures are introduced in the farms (all wall boundry around the farms, sanitary checks, desinfecting barriers, desinfecting chambers, provision of uniforms, etc.).

The procurement storage of meat, products and raw material is checked in the farms and in shops.

[illegible]

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II. [illegible]

[illegible]

[illegible] of meat, products and raw material [illegible] in shops.

The barns and other buildings on the territory of the farms are systematically disinfected, so is the sewage and the waste, veterinary-sanitary points are set-up on the basis of procurement and maintainance of animals.

The vehicles used for transporting the animals and bringing-in of fodder to the farm are kept in good order, the boats utilized to transport the animals, products and raw materials are also checked.

The milk and other milk products at the dairies and milk producing enterprises are checked; the waste of the dairies is rendered harmless.

The animals coming-in from other farms and the regrouping of animals in the farms and their distribution is controlled by the veterinarians, the grasing grounds for the farm animals are separated from those grounds which are earmarked for privetly owned cattle a systematic information is made available with regard to any foot-and-mouth epizootic in other regions, storage and transportation of fodder to the farms are checked.

The prophylactic immunization of all the large cattle is carried out in regions and zones where cases of foot-and-mouth disease have been reported during the last few years, the sheep are also immunized in areas where foot-and-mouth infections had flared up, or in such areas where there is a threat of such a disease; the veterinary sciences are publicized among the farmers and the public in general, giving information on the problems of immunization and measures to combat the foot-and-mouth disease.

III. MEASURES TO ELIMINATE THE FOOT-AND-MOUTH DISEASE.

Complex measures are carried out in accordance with instructions; the sources and the modes of spread of the infection are studied; immunized zones are formed around the farms and populated areas where a flare-up of the foot-and-mouth virus is reported, by vaccinating the animals; additional measures are taken in areas where foot-and-mouth flare-up had been been registered in Autumn-Winter periods, if it was not possible to carry out the required operations to eliminate the inciting virus within the surrounding media; the animals that had developed the foot-and-mouth disease are registered and in most

[illegible] and other buildings on the territory of the farm [illegible] thoroughly disinfected, both the manure and the [illegible], whenever sanitary points are set-up on the basis of [illegible] and maintenance of animals.

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cases they have to be slaughtered to eliminate possible carriers of the foot-and-mouth virus; the slaughter-houses and enterprises that utilize the meat and products of farm animals are checked.

To protect the animals from the foot-and-mouth infection, an effort is made to study the epizootic in the bordering Repubàics and Nations and, depending on the severity of the after effects, the import of animals and animal products are prohibited for the required duration. A compulsory 30 day quarantine of animals, brought from the neighboring zones, purposes the same object.

A recent incident thas illustrated that such measures are very necessary. As a result of the development of the trade agreements, it was decided to purchase 50 heads of peaigreed cattle from a neighboring country. A foot-and-mouth virus was spotted among these animals at the border veterinary check point. Only the timely diagnosis and slaughter of all the purchased cattle at the isolation point made it possible to avert an epizootic.

The sick animals must be slaughtered and their meat must be taken care of on the spot.

By this measure it is possible to eliminate a large volume of the virus, stop it from further spreading finally arrest the virus carriers and in this manner break the epizootic chain.

However, there are problems in the feasibility of implementation of this useful step from the economical and preventative point of view, as so far, no law has been formulated to compensate the private owners, the cost of their animals on the average annual market value and the difficulties connected with the slaughtering and realization of meat. This problem is still to be solved.

When the flare-up of the foot-and-mouth disease is to be arrested, depending upon the economic factors and other conditions, quarantine points are organized in the breeding areas of the virus, the affected area and the zones threatened by the infection, which are situated within the radii of a few kilometers.

cases they have to be slaughtered to eliminate possible carriers of the foot-and-mouth virus; the slaughter-houses and enterprises that utilize the meat and products of these animals are checked.

To protect the animals from the foot-and-mouth infection, an effort is made to study the epizootic in the neighboring Republics and Nations and, depending on the severity of its after effects, the import of animals and animal products is prohibited for the required duration. A compulsory 30 day quarantine of animals, brought from the neighboring [illegible] purposes the same object.

A recent incident shows illustrates that such measures are very necessary. As a result of the Soviet-Iranian trade agreements, it was decided to purchase 30 head of pedigreed cattle from a neighboring country. A foot-and-mouth virus was spotted among these animals at the last veterinary check point. Only the timely diagnosis and elimination of all the purchased cattle at the location point made it possible to avert an epizootic.

The sick animals must be slaughtered and their meat must be taken care of on the spot.

By this measure it is possible to eliminate a large volume of the virus, stop it from further spreading finally arrest the virus carriers and in this manner break the epizootic chain.

However, there are problems in the feasibility of implementation of this useful step from the economical and preventative point of view, as so far, no law has been formulated to compensate the private owners, the cost of their animals on the average annual market value and the difficulties connected with the slaughtering and realization of meat. This problem is still to be solved.

When the flare-up of the foot-and-mouth disease is to be arrested, depending upon the economic factors and other conditions, quarantine points are organized in the breeding areas of the virus, the affected area and the zones threatened by the infection, which are situated within the radii of a few kilometers.

Such quarantine measures for all the three points results in definite economical losses and a long period of such quarantine has unsatisfactory results on the sanitary system, bringing about violation of rules.

Apparently, a scientifically based system must be developed for the threatened zones, which would secure these zones from the entry of the foot-and-mouth disease and, at the same time, decrease the period of such measures for these farms.

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